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Dr. Rahul Sharma –
Director-India, International Zinc Association

Ruchika Jha -
Founder, Arkya Consulting

- **ROLE OF ZINC IN FUTURE**
- **Optimizing Cast House with RiA**
- **Lead & Lead Batteries Conference : A Resounding Success**

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D. A. Chandekar
Editor

Dear Readers,

'Asian Metallurgy' show was launched as a bi-yearly exhibition & conference in 1997 in Mumbai. First few editions were held at Nehru Center but later it was shifted to BEC, Goregaon for want of bigger space. In the next decade or so, it was regarded as the most acknowledged trade show for the metallurgical industry in Asian region, covering both ferrous and non-ferrous sectors. It featured the 'Steel & Metal Expo,' a global exhibition highlighting cutting-edge technology, equipment, and products, along with the specialized seminars addressing the challenges faced by various sub-sectors. The global pandemic of covid – 19, which struck the world in Jan/Feb 2020, altogether changed the human life in all the spheres including the industry. It not only changed the way industry functions but it changed the mindset of people who were running it. While everything else was bad, bitter and dark about covid-19 pandemic, it gave us few wisdom tips as well. 'Work from home' or 'Digitalization' were old concepts but they got a big boost during covid days and today even after the pandemic is completely subsided, these concepts are still being used. Especially Digitalization has revolutionized the manufacturing industry and is being improvised every day. We too brought the concept of digitalization in the way trade shows were conducted and the Asian Metallurgy show, which was traditionally held on ground, saw a successful transition to the digital format in last three years or so. Not only 'Asian Metallurgy' show but all the other events such as 'Special Steels Convention', 'Iron & Steel Summit' etc. Are being successfully conducted on digital platform since last few years.

Participating in this digital B2B event offers significant advantages. It provides extensive global reach. You can have exhibitors, speakers, participants from all over the world. The event can really become 'global' in true sense. The second big advantage is cost effectiveness. While it takes few lacs of rupees to participate in a good ground exhibition, it takes only few thousand to participate in such digital expo. The third big advantage is 24/7 accessibility. The visitor can visit the expo and your booth any time from anywhere in the world. Of course one must admit that in such virtual events, there is no opportunity to have physical interaction and develop personal rapport.

With more and more use of Artificial Intelligence (AI), Virtual Reality (VR), Augmented Reality (AR), in our daily lives as well as in the industry, I am sure the digital space and opportunity for trade shows is here to stay and expand in the future. It brings the regional economies closer and facilitates global trade.

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ROLE OF ZINC IN FUTURE

The Asian Metallurgy Show, originating in 1997 as a physical exhibition shifted to a digital platform post-Covid, commencing in 2021. This virtual Steel n Metal Expo was held from 18-23 December 2023 which included stands and online webinars addressing various industry topics such as digitalization, commodity trading, and green steel production. The webinar **'Role of Zinc in Future'** focused on the expanding role of zinc in diverse sectors and its implications for the industry's future.

The panel of experts included L Pugazhenthy, a seasoned professional with over 45 years of experience in Lead & Zinc market development and technical advisory services. Dr. Rahul Sharma, Director-India for the International Zinc Association, who bought a wealth of experience from his tenure with Corus India Pvt Ltd. and Hindalco Industries Limited. Additionally, Ruchika Jha, an accomplished leader with extensive expertise in P&L leadership, strategy formulation, and sustainable procurement, joined as the Founder of Arkya Consulting and has notable experience with Vedanta Ltd.

D.A.Chandekar (Convenor) - Tell us about the zinc industry and its present applications.

L Pugazhenthy - Zinc an ancient metal with historical roots seen in brass production, holds

L Pugazhenthy –
Executive Director, ILZDA

significance in India's industrial landscape. In the past, India heavily relied on imports for zinc, up until the early 2000s when the Vedanta Group, led by Anil Agarwal, spearheaded a remarkable transformation in the zinc industry. Prior to this, the sector faced challenges, operating under a public sector setup, where approvals were slow, hindering technological advancements. However, post-2000, a brighter era unfolded. Significant expansions in smelting, mining, and power capacities, critical for zinc production, were undertaken. This strategic focus led to a substantial increase in zinc output, transitioning India from import dependence to self-sufficiency and even enabling exports.

From 2002 to 2023, zinc production surged from 8,000 to 25,000 tons, meeting domestic demands and enabling export capabilities. Notably, India's usage pattern stands out globally, with 72% of zinc directed towards galvanizing steel sheets, structural elements, wires, guardrails, telecom and electrification towers, surpassing the global average of 60%. Other applications, such as die casting (constituting 7%), brass production (around 10%), and zinc for batteries (about 3%), complete the usage spectrum. This emphasis on galvanizing is closely tied to India's robust steel production, ranking as the world's second-largest steel producer, fostering continuous growth in zinc demand for galvanization purposes.

D.A.Chandekar (Convenor) – What role do industry associations play, and why are they necessary to drive the industry forward?

L Pugazhenthy - While most

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industry associations and trade bodies primarily focus on lobbying with the government for policy changes related to duties, taxes, and protection, ILZDA stands apart as a purely technical entity. Rather than engaging in lobbying efforts, ILZDA operates as a specialized technical body that concentrates on bridging the gap between international developments, R&D outcomes, and trends, channeling these insights into India via seminars, conferences, and publications. The Indian industry necessitates advancements in technology, market development, and standardization, requiring substantial technical expertise—precisely where ILZDA has excelled over its 62 years. Collaborating extensively with the International Zinc Association and similar bodies globally, ILZDA effectively delivers the latest technical information, advice, and technological inputs to India's industrial landscape. Moreover, ILZDA's role extends beyond educating zinc and lead consumers like battery manufacturers; it also encompasses educating various government sectors such as CPWD, railways, and power entities on efficient and economical zinc utilization. Additionally, ILZDA endeavors to educate and engage the engineering community, including civil engineers, architects, and builders, contributing to a holistic approach in disseminating technical knowledge and promoting efficient zinc usage across sectors.

Dr. Rahul Sharma- Zinc's potential seems highly promising, especially in the realm of battery technology, encompassing zinc-air and zinc-nickel batteries, both developed and undergoing further refinement. Moreover, zinc's contribution to stabilizing and extending the lifespan of structures and global infrastructure is noteworthy, showcasing its versatility in fostering sustainable energy solutions and infrastructure development.

Dr. Rahul Sharma – Director-India, International Zinc Association

During the COVID-19 pandemic, there was a surge in discussions about zinc's role, notably in supplements, as doctors often recommended zinc-based supplementation to bolster immunity when vaccines were unavailable. Being a vital micro nutrient required daily by humans, it remains within the body, boosting immunity significantly, particularly during seasonal transitions. This underscores zinc's healthcare applications, extending its relevance to agriculture, where its deficiency in nearly 50% of Indian soil affects plant absorption, potentially leading to deficient diets for consumers. Hence, the Indian government recommends controlled zinc use in fertilizers to mitigate this deficiency, impacting both crop and human health.

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Zinc's applications also extend to antibacterial properties seen in alloys like brass, used in various settings such as door handles, exhibiting its ability to inhibit bacterial transmission. Additionally, zinc finds application in photovoltaics, notably in thin-film solar cells, aligning with global initiatives to augment renewable energy usage, including solar power. The International Zinc Association, a non-profit organization, operates globally, supported by zinc and steel companies, focusing on technology development across various domains like colored galvanizing, zinc-based energy solutions, nanosizing technology, and numerous battery applications. Their ongoing research promises substantial advancements in these areas.

Ruchika Jha- India currently finds itself in a

Ruchika Jha -
Founder, Arkya Consulting

favorable position concerning steel demand and overall economic resilience. During downtrends in demand, the government's interventions tend to rejuvenate the economy swiftly, indicating a strong correlation between economic progress and demand, often seen as a factor of 1.5 to 2 times the GDP. Presently, with a focus on rural electrification and infrastructure development, zinc's predominant use in galvanizing steel remains pivotal in India's construction projects like airports, metros, and smart cities. The growing consumer awareness is fueling market growth, with last year's market size hitting approximately 650,000 tons and an expected surge to 720,000 to 750,000 tons this year.

Regarding industry associations, beyond providing marketing and technical support, these forums serve as well-organized platforms where diverse participants, from researchers and industry players to consumers, can exchange perspectives on critical industry-specific matters. This inclusive approach is crucial for balanced policy decisions, preventing a single-sided push by either producers or consumers. The involvement of international experts in these forums is invaluable, offering solutions and expertise on various technical and market-related challenges.

The primary role of associations lies in unifying stakeholders, fostering diverse perspectives, and offering extensive networking opportunities and industry-related data. As a co-founder of Women in Mining India, empowering women in the mining sector is a passion, aiming to encourage greater female participation and leadership roles, fostering positive change within the industry and the economy.

D.A.Chandekar (Convenor)- The core of India's growth narrative, much like many Asian countries, lies in infrastructure development. This is pivotal for economic progress, and metals are indispensable for this advancement. Therefore, for India to advance, its metals industry must thrive. Looking ahead, what potential sectors could drive the growth of zinc? Furthermore, how might the profile of zinc users evolve in the future?

L Pugazhenthy- In India, there's been significant investment in infrastructure over the past few years, spanning various sectors like power, telecom, railways, highways, rural electrification, and water supply. This surge in infrastructure development has led to a soaring demand for steel, which is crucial across

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agriculture, manufacturing, and services. Initiatives like National Highway Development Project, Sagar Mala, Bharat Mala, and others further fuel this demand. Galvanization, especially for structures in corrosive coastal areas, holds immense potential for safeguarding against corrosion-related issues like collapses seen in flyovers and concrete structures. Protecting rebars with zinc offers safety and enhances structural durability, a vital consideration for bridges, buildings, and highways in such areas. Despite this potential, the usage of zinc for protection is relatively low due to cost considerations among civil engineers and architects. Additionally, using coated sheets in automobile bodies extends their lifespan significantly, a practice common internationally but less prevalent in India. Zinc spraying, another underutilized technique, can be implemented on-site for various public infrastructure structures like footbridges or fencing. These untapped avenues, including galvanization, zinc-coated sheets in automobiles, and zinc spraying, represent significant growth opportunities yet to be fully explored in the country.

Dr. Rahul Sharma- There are a couple of key issues affecting Indian Railways' infrastructure. Firstly, the railways, being the largest consumer of steel in India, suffer significant losses due to corrosion. Track damage leads to train delays, increased maintenance, and decreased speeds. Corrosion is primarily caused by various factors like bird and animal droppings, as well as acidic elements from waste. Normally, rails should last around 12 years, but due to corrosion, they often need replacement within 1.5 to 2.5 years, especially in coastal areas.

To address this, Indian Railways has adopted new methods like using zinc thermal spray rails that can last for 12 years. They've also introduced continuous galvanized rivets, a cost-effective technology that's particularly useful in coastal regions with high corrosion rates. These innovations aim to enhance rail durability and reduce maintenance costs. Additionally, there are more advanced technologies available globally, but these might be gradually introduced as India's railway systems evolve and become more sophisticated.

Ruchika Jha - Using social media effectively for awareness campaigns, webinars, and podcasts could greatly benefit in educating a wider audience, even beyond the metal industry, about the challenges and advancements in the field. For instance, the Zinc Metalizing project showcased successful collaboration between government bodies, research organizations, and steel producers. This project aimed to address challenges in on-site galvanizing, providing a practical and cost-effective solution.

While galvanizing remains crucial for preventing corrosion in steel, there's a growing need to explore other zinc applications beyond galvanizing, such as zinc oxide, batteries, and energy storage systems, which are more zinc-intensive. Unlike the global trend where 40-50% of zinc is used in galvanizing, India's usage is higher at 50-70%. This points to an opportunity to diversify zinc applications in India.

The demand for zinc in these intensive applications could be significant. While one ton of steel uses about 2% zinc in galvanizing, other applications like zinc oxide can require up to 85% zinc, indicating the potential for greater zinc usage in diverse sectors. Collaborative efforts between industry and government can facilitate this shift towards exploring and promoting zinc-intensive applications beyond traditional galvanizing, aligning with the evolving needs of the Indian economy.

D.A.Chandekar (Convenor)- Do you have any final thoughts or additional remarks you'd like

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to share?

Ruchika Jha - Absolutely, in addition to market development, the synchronization of product development is crucial. When exploring new zinc applications, it's not just about utilizing standard-grade zinc; adjustments in composition, shape, or form might be necessary. Thus, integrating programs that align product development with market initiatives will shape the future of zinc. While India is progressing in developing alloys and exploring zinc oxide applications, there's notable importation of various alloy variants from countries like Korea. Enhancing awareness through social media, akin to campaigns by industry peers, remains a key suggestion, and as part of the zinc community, I'm always eager to lend support.

Dr. Rahul Sharma - Zinc's role in various sectors holds significant promise for the

future, with new applications emerging on the horizon. However, there's a need for a catalyst to drive its widespread adoption. Convincing decision-makers to use zinc can be challenging due to initial costs, despite zinc being cost-effective in the long run. Calculating life cycle costs demonstrates zinc's economic advantages over non-galvanized steel, which demands frequent repainting, leading to unnecessary expenses. Redirecting these savings could contribute to building essential infrastructure like hospitals, schools, and offices in India's growing economy.

L Pugazhenthy - The government sector, being the largest steel consumer, is a focus for education initiatives targeting engineers, considering turnover due to retirements and new recruits. While progress is made through programs conducted in government offices, further efforts require more resources and government commitment. Additionally, engaging with students during personal or official visits, discussing zinc's role in electric mobility, renewable energy, health, and agriculture, aims to raise awareness among the younger generation. Expanding educational outreach to students remains a priority.

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Optimizing Cast House with RiA

Introduction

RIA Cast House Engineering provides precision rail-mountedCast House proven Charging and Skimming equipment for Aluminium Cast Houses worldwide. The design and development of all RiA Machines take reliability, durability, maintenance and occupational safety into account. RiA has supplied over eighty Furnace Charging and Skimming Machines, all rail-mounted and capable of Charging up to 30 Metric Tonnes in less than 90 seconds or Skimming a Furnace faster than a traditional Forklift Truck or wheeled Furnace Tending Vehicle, but with more repeatable results and without damaging the refractory lining. Key customers include Hydro, Constellium, Matalco, and many others. Several clients have multiple Machines in the same Cast House or across multiple sites and territories. One client alone has implemented more than thirty RiA Machines in ten different countries.

In recent years, in conjunction with our exclusive partner Fioscope GmbH, RiA added the innovative capability of AI Smart Camera based decision making to our Machines to offer fully Autonomous operation and therefore removing the requirement to have operators on or near our Machines. RiA's Managing Director, Michael Rockstroh also became Managing Director of Fioscope GmbH in February 2022, helping to drive the continuous development of RiA's AI enabled Autonomous Machines and assuring our growing customer base that RiA equipment is not only suitable for today, but also tomorrow and beyond.

Autonomous Furnace Charging Operation Maximising Safety and Productivity

In typical operations, the melt cycle cannot be observed without opening the door and losing heat and energy, as well as the associated safety risk to the operators. Therefore, valuable minutes can be lost if the furnace is ready to receive the next charge, but the operators are unaware since the contents are not visible. For several years, RiA have integrated Smart Cameras on boardits Machines and infurnaces to enable autonomous operation. Significant advances in process control are thenpossible using air-cooled Smart Cameras.High-temperature resistant cameras allow for real time observations of melt progress. They provide a safe and real-time process development benefit that was in the past impossible to even observe let alone monitor, without opening the furnace door.

Kiran Deshpande
Country Manager, India, RiA Cast House Engineering GmbH Germany

RiA's Intelligent Camera's monitor the progress of the scrap pile, as it melts. The Camera's determine the earliest possible moment in which the Charging Machine can deliver the next charge. Through this, autonomous operation is possible. Figure 1 shows 3 still Images taken for the purpose of this article from the operator station at one of RiA's fully Autonomous Charging Machine installations. Three different stages of the melt cycle are shown, following a charge. The first image shows the furnace with a scrap pile that has recently entered the furnace, using a 'traffic light' visual for the operators, the Intelligent Cameras not only relay the image but also highlight using the red light that the furnace is not ready to receive the next charge.

A yellow signal on the second image indicates that the Intelligent Cameras are detecting that the scrap pile has lowered in height and is therefore getting closer to the point in which RiA's Charging Machine can enter the furnace without contacting the scrap pile. Operators are now alerted to the fact that within the next few minutes they must conclude loading the container

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to ensure RiA's Charging Machine can deliver the next charge at the earliest possible moment, ensuring valuable production time is utilised.

No time is lost during the charging phase of the melt cycle ensuring maximum productivity of your Cast House. Once the Charge Machine is loaded, operators can complete other tasks as RiA's Intelligent Cameras trigger the cycle to begin, requiring no further operator interaction. Once the cycle is complete, the RiA Charging Machine moves back to the loading position to prepare for the next charge. As Figure 2 shows, the furnace charging cycle can be viewed safely from the monitor in the operator pulpit via another camera mounted at

Fig 1: Screenshots of RiA's Intelligent Cameras relaying real time information of melt progress to the Cast House.

Finally, the third image and green light indicates that the Furnace is ready to receive the next charge. Previously, the furnace door would need to be opened for the operators to confirm this information and make informed decisions, but in this case, RiA's Intelligent Cameras detect the scrap pile is now low enough for the Charging Machine to enter, deposit the next load and retract from the Furnace without contacting the scrap already inside. Whilst ensuring maximum productivity through charging at the earliest appropriate time, there are also significant safety benefits as the requirement to open the furnace door is significantly reduced, combined with giving operators the assurance that they are not charging the next load into liquid aluminium. As operators are shown the time period they have to ensure the Charging Machine is loaded, this helps to ensure the Furnace contents will not be in a molten state, an important safety feature of high value to many of RiA's customers.

Fig 2: RiA's On-BoardCamera monitoring the Furnace Charging cycle, relaying the footage to operators who can be situated in the safety of the operator pulpit.

Even if you do not yet operate RiA's Charging and Skimming Machines, using our In-Furnace Vision technology would allow you to safely recognise when it is the optimum time to charge your Furnace, knowing that you are doing it at the earliest and safest time, every time.

In summary, Smart Cameras reduce unnecessary door openings, shortening cycles and saving energy. These systems can increase safety and potentially avert accidents. Smart Cameras also allow the melt cycle to be optimised, ensuring charging can take place safely, at the first opportunity. Furnace Monitoring Systems allow playback, trouble shooting and diagnostics. It is believed that in the future all new Furnaces will incorporate In-Furnace Cameras. Contact RiA to find out how we can help optimise your operation.

<u>Autonomous Skimming, Maximising Productivity and Safety</u>

In typical operations, melting and holding furnaces are skimmed by either a wheeled vehicle or a rail mounted machine. Typically, both are driven by an operator present on board the machine to give them a direct view into the furnace to locate the dross to skim from the melt surface.

The above process presents two main concerns for the Aluminum Cast House. The first concern being that operators have to be on board the machine, exposed to the heat and potential dangers of molten aluminium. Secondly, operator driven wheeled vehicles typically have long skim booms that move with little control or precision when skimming the furnace. Often, this causes unnecessary

damage to the refractory lining within the furnace leading to the earlier replacement of refractory walls and the furnace sill and lintel. Not only does this incur the cost of replacing the refractory lining more frequently, but also the lost production time with the furnace being down to conduct the necessary repairs, often for several weeks.

To address the historical issues with Furnace Skimming, in 2019 RiA Introduced Fioscope's Air-Cooled Smart Camera's on board our Skimming Machines, as shown in Figure 1. The camera's are air-cooled to manage the radiant heat from the furnace, which typically operators would be exposed to.

Fig 3: Fioscope's Air-Cooled Smart Camera Technology for High Temperature Applications, onboard a RiA rail-mounted Skimming Machine.

Camera images are relayed to the operator pulpit and the operator can watch the skimming cycle from a safe location, away from the furnace. RiA Skimming Machines had been capable of automatic skimming for some years. Through precise position measurement and control, it is possible to follow a pre-determined skimming pattern, lane-by-lane, to remove the dross from the Furnace, without contacting or damaging the refractory nor the need for an operator to be onboard the machine. However, the machine will skim the entire surface of the bath regardless of the location of the dross, or if the dross moves into an already clean and previously skimmed lane, the machine was effectively blind and would not react. The solution was to install Smart Cameras on the Skimming Machine that have a view of the bath surface. The cameras identify the difference between dross and a clean surface and drive the skim blade to the location of the dross and remove it from the Furnace. Figure 2 shows the Smart Cameras automatically recalculating the bath cleanliness based on the image from the camera. Using an internal neural network, RiA train the Cameras to differentiate between a dross layer and the molten aluminium. With a predetermined desired cleanliness, RiA's Skimming Machine will autonomously skim the bath until this cleanliness percentage is achieved across the grid overlayed onto the bath surface. Smart Cameras allow for the recalculation, if dross were to move past the skim blade as it moved through the dross layer, something that a blind robotic machine does not see.Smart Cameras mounted on RiA's Skimming Machine also set the depth of the skim tool, ensuring it is at the optimum depth to skim the dross from the melt surface. Once again all of this is possible, without human interaction, other than to initiate the cycle. Even then, if the Furnace contains RiA In-Furnace Smart Cameras, they can determine when flat bath conditions are achieved, ready for skimming. Having established these capabilities, all RiA Charging and Skimming Machines, sold in recent years, were either sold with fully Autonomous capability or were built in such a way that this could easily and modularly be added at a future date.

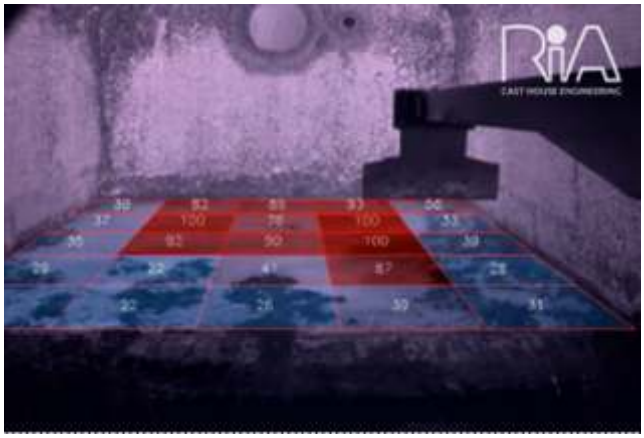

Fig 4: RiA's On-Board Smart Cameras calculating bath surface cleanliness in real time during the skimming process.

This fully Intelligent capability is already implemented in several Cast Houses Worldwide and significantly in the European and US markets. The Machine will not only Skim, but also Stir and Mix the Bath contents as well, to ensure Homogeneity and can also clean the refractory between cycles or alloy changes. In this final case the Blade needs to contact the refractory, but because the refractory locations have been programmed into the PLC, the approach speed and pressure of contact is reduced, minimising refractory wear and damage.

All RiA Machines incorporate accurate Laser position sensors and Laser safety scanners. As they are rail mounted, all Cast House personnel are aware of the possibilities and direction of movements. Even then if a person or an object is in the path of movement, the Machine will slow down and stop without contacting the object in its path.

The benefits of implementation of such technology in your Cast House include:

- Significantly increased Productivity and reduced Energy Consumption due to shorter Skimming Cycles and less heat loss.
- Reduced Refractory damage ensuring significantly longer Refractory life and more Furnace operational uptime.
- Reduced forklift movements in the Cast House leading to increased Operator Safety and reduced maintenance.
- Removal of Operators from the skimming process, increasing Operator Safety.

The vision of a Smart Cast House with Operator Safety a high priority is no longer just a vision for RiA, but already a reality.

_RiA Exclusive Patent – In Furnace Dross Processing (IFDP)

RIA's next innovation in furnace skimming is a game changer in dross processing. The process of In-Furnace Dross Pressing (IFDP) is a patented process that increase aluminum recovery and reduces the amount of dross removed from the furnace.

The concept behind the IFDP is to squeeze the dross on the furnace sill before it leaves the furnace and gets too cold or too hot to effectively removal all the contained aluminum. The unique designed skim blade compresses the dross against the cold plate removing aluminum and rapidly cooling the dross preserving metal units. The In-Furnace Dross Processing is achieved in synchronization with the skimming cycle. The liquid Aluminum flows back into the furnace and the cooled dross is removed in the skim cycle. The skim blade and cold plate are uniquely designed to produce a cooled dross cake with aluminum concentrated on one side and oxide on the other enhancing secondary recycling. The IFDP cycleis automated and repeated until the furnace is completely free of dross.

The IFDP providesseveral of advantages compared to traditional technologies. Most important is the reduction of metal losses at its occurrence. Up to 80 % of the liquid metal contained in the dross flows back into the furnace and does not need to be processed or re-melted. Furthermore, the dross will be cooled immediately during pressing. This reduces additional metal losses. The skimming cycle is minimally extended by the IFDP system in.

Figure 5: RIA Skimming Machine with In-Furnace Dross Press

Summary

The precise RiA Skimming machine movements and the programmed contact to the refractory contours as well as the adjusted plate pressure to the refractory eliminated collisions with and damage to the refractory lining. This reduces maintenance on the refractory significantly. Using a RIA skimming machine reduces skim cycles saving energy, increases the occupational safety in all modes of operation, because even in manual mode the operator is protected by an insulated operator cabin.

The AI and IFDP features in combination with the known advantages of the RIA skimming machine make thisthe best technology for furnace skimming.

Lead & Lead Batteries Conference : A Resounding Success

An "International Conference on Lead & Lead Batteries – Engineering Sustainable Growth" was organized by India Lead Zinc Development Association (ILZDA) at New Delhi during 7 & 8 Dec 2023; the event was supported by International Lead Association, International Lead & Zinc Study Group, Battery Council, International Consortium for Battery Innovation, Bureau of Middle East Recycling, IBMA, IESA, MRAI, REIAI, NRCLPI, SAEST, IIM, FEVA, MCX, Wirtz etc. The conference was cosponsored by Luminous, Exide Industries, Gravita India, Amararaja Batteries, Livguard, Okaya, Microtex, Ace Green, Jain Resource Recycling, MY Group etc.

About 200 delegates from various sectors (Lead, Batteries & Recycling) joined and benefitted from the conference deliberations. In all 30 technical presentations were made on Energy Storage, Innovations, Battery Technology, Green Recycling, Electric Vehicles Sustainability etc. Towards the end of the event, a Panel Session was held wherein select Industry Experts articulated their views and indicated the future road map for the Indian Lead battery and the Lead recycling sectors.

During the Conference, two popular and well known industry captains in the Indian Lead battery manufacturing & Lead battery recycling sectors - Mr Rakesh Malhotra, Founder Chairman of Luminous Power Technologies Pvt Ltd & Mr Rajat Agrawal, Managing Director, Gravita India Ltd - were recognized and honoured with "Distinguished Services Award". By recognizing such very successful entrepreneurs, ILZDA wants to motivate many youngsters and startups in the years to come.

Feature

Foundry Binder Systems for Ideal Metal Casting

Metal casting processes rely significantly on sand molds and cores shaped by binders. Binders play a pivotal role in ensuring high-end casting quality by holding together sand grains and influencing the final characteristics of the casting.

In the foundry industry, various types of binders exist, primarily categorized into two types: inorganic and organic. The selection of a binder depends on multiple

factors, including the casting requirements, process feasibility, and material characteristics.

Resin, a crucial constituent of binders, often encompasses phenolic, furan, or alkyd compounds. Alongside the resin, hardeners and catalysts play essential roles in cross-linking agents and controlling the reaction between the resin and hardener.

The types of resin systems are diverse, each offering distinct advantages and disadvantages. Heat-cured, no-bake, and gas-cured processes each have unique curing requirements and resultant qualities, influencing factors like cost, curing time, and shelf life.

For instance, the Shell Process, employing phenol-formaldehyde novolac in alcohol solution as a resin, boasts exceptional qualities such as long shelf life, humidity resistance, and excellent surface finish. However, it may come with higher costs and longer cycle times.

The Hot Box/Warm Box Process, utilizing urea-formaldehyde or furfuryl alcohol as resin, is cost-effective, ideal for aluminum castings, and offers high productivity. Nonetheless, it might have limited storage life for cores and poor humidity resistance.

Another variant, the Phenolic-Acid NoBake process, involving phenol-formaldehyde resole as resin and sulphonic acid as hardener, stands out for its low-cost advantage, high air cure strengths, and sand reclamation efficiency. However, it requires strong acids for curing and is sensitive to sand quality.

Vilas B. Jadhav
Director
Ceraflux India Pvt. Ltd.
Kolhapur

The Phenolic-Ester No-Bake process, also known as Alphaset, utilizes alkaline resole as resin and organic esters as hardeners. This process shines with simple cleaning, resistance to sand quality variations, and excellent casting finish, making it ideal for steel castings.

Furan No-Bake, involving urea-formaldehyde or furfuryl alcohol copolymer as resin and sulphonic acid as hardener, offers versatility in catering to different metal types. It requires careful resin and hardener selection and may exhibit brittleness in the binder bond.

Phenolic-Urethane No-Bake, known as Pep Set, closely resembles the cold box process and offers excellent shelf life for binder components, high strengths, and suitability for various metals. However, it might be sensitive to moisture and produce lustrous carbon during pouring.

The Gas-Cured Process, particularly the Phenolic-Urethane-Amine Cold Box, enables instant core formation at room temperature, ideal for mass production in automobile and ductile pipe castings. It

offers high productivity but demands careful consideration of sand quality and system moisture.

Silica sand quality remains crucial in these processes, with grain size, shape, surface, and impurity content influencing performance. Understanding the nuances of different binders and their interaction with sand is pivotal for achieving desired casting qualities.

In terms of domestic production potential, various binder types exhibit differing capacities, ranging from Shell Resin with 3000 t/m potential to Alkyd with 100 t/m potential.

In conclusion, the selection of the appropriate binder system is crucial in metal casting, influencing not only the quality and characteristics of the final product but also the efficiency and economics of the casting process itself. Foundries must carefully consider the specific requirements of their casting operations to determine the most suitable binder system for optimal results. ■

Feature

GDC Tech Forum's Mega Event Sets a Benchmark

The Great Die Casting Technology Forum, a prominent entity in the Aluminium Die-Cast Industry based in Pune, orchestrated a remarkable mega event at the Chennai Trade Centre from December 1st to 3rd, 2023. With a membership exceeding 350 companies across India, this event drew significant attention and participation.

This event boasted the presence of 120 reputed companies showcasing their equipment, products, and capabilities. It served as a platform for industry experts, featuring 22 presentations of technical papers, high-level panel discussions, a best casting design competition, casting buyer-seller meet, and a special day dedicated to students.

Spanning over three days, the event commenced with an inaugural ceremony graced by esteemed individuals:

Chief Guest Conference Inauguration: Mr. Rajendran C., Senior Vice President, Head – Manufacturing, Ashok Leyland Ltd.

Chief Guest Exhibition Inauguration: Dr. Shankar Venugopal, Vice President & Head Technology, Mahindra & Mahindra

Keynote Speech by: Mr. Srinivasan Ravi, Chairman & Managing Director, Craftsman Automation Ltd

Guest of Honour: Pradeep Goyal, President, ASM International, CMD, Pradeep Metals, Chairman, Advisory Board Committee, FTF

Parallel events included a Forging Conference and Exhibition attended by 150 participants, two insightful panel discussions on topics related to MSME foundries and capabilities for developing export markets, and an engaging final quiz competition won by the Caparo Team.

A series of competitions were held, recognizing outstanding performances:

Project Competition Winners: ENDURANCE TECHNOLOGIES LTD., STEEL STRIPS WHEELS LTD., SUNDARAM CLAYTON LIMITED, UNO MINDA LIMITED

Best Casting Competition Winners: PDC Category - UNO MINDA LIMITED, GDC Category – VICTORY PRECISION

Best Design Competition Winners: HPDC - Die Tech & Aakar, GDC - Caparo (Proposal 1) and Victory (Joint Winner), LPDC - Die Tech

The event's culmination was marked by the closing ceremony graced by Shri. Vivek Joshi, the CEO of Sundaram-Clayton. His vision for the future of the die casting industry emphasized principles of Lean, Green, and Connected practices, inspiring all attendees.

The three-day extravaganza witnessed an amalgamation of knowledge sharing, industry insights, and recognition of exceptional contributions, fostering advancements and setting a benchmark for the die casting industry's evolution.

Passenger vehicle sales reach to all-time high in November: SIAM

The Indian passenger vehicle segment achieved its highest-ever sales in November 2023, reaching 3.34 lakh units. This figure reflects a 3.7 per cent year-on-year growth compared to November 2022 when sales were at 3.22 lakh units.

As per the recent data released by the Society of Indian Automobile Manufacturers (SIAM), indicates a positive trend in the automotive industry.

The passenger vehicle category spearheaded the growth, witnessing a substantial increase in sales during November 2023. With 3.34 lakh units sold, it surpassed the previous year's figures, contributing significantly to the overall positive trend in the automotive market.

Three-wheelers reported a remarkable growth rate of 30.8 per cent compared to the previous year. November 2023 saw sales reaching about 59,738 units, approaching the peak observed in November 2017 when sales touched 45,664 units.

Two-wheelers, a crucial segment in the Indian automobile market, showcased a remarkable sales figure of approximately 16,23,399 units in November 2023. This marked a substantial growth of 31.3 per cent compared to the same month in 2022. The segment's performance was only slightly below the peak recorded in November 2018.

The SIAM report noted that data for prominent auto manufacturers such as BMW, Mercedes, JLR, Tata Motors, and Volvo Auto were unavailable and hence not included in the sales data.

Reflecting on the robust growth across all segments during the festival season ending in early November, Vinod Aggarwal, President of SIAM, commented on the industry's positive outlook.

Aggarwal said, “All segments of the automobile industry witnessed robust growth during the festival season which ended in the first part of November. For the month, Passenger Vehicles sales grew moderately, and Two-Wheelers and Three-Wheelers segments posted high double-digit growth. Commercial Vehicle sales matched last year's levels. Supported by strong economic growth, the industry is optimistic about ending the year 2023 on a high note and expects the trend to continue into 2024.”

Rajesh Menon, Director General of SIAM, highlighted the significant achievement in the passenger vehicle segment, reaching record-breaking sales in November 2023.

Menon said, “Passenger Vehicles posted the highest ever sales in the month of November 2023 of 3.34 Lakh units, albeit with a growth rate of 3.7 per cent, in the backdrop of a high base last November. Three-Wheelers reported significant growth of 30.8 per cent, compared to the previous year, posting sales of about 0.60 lakh units in November 2023, just below the peak of November 2017. Two-Wheelers also reported sales of about 16.23 Lakh units with high growth of 31.3 per cent, compared to November 2022 and is also slightly below the peak to November 2018.”

The November 2023 sales report underscores the resilience and upward trajectory of India's automotive industry, providing a positive outlook for the coming months.

The optimism is fuelled by strong economic indicators and the industry's anticipation of continued growth in 2024.

SIAM

Segment wise Comparative Production, Domestic Sales & Exports data for the month of November 2023

(Number of Vehicles)

Category / Segment/Subsegment	Production November		Domestic Sales November		Exports November	
	2022	2023	2022	2023	2022	2023
Passenger Vehicles (PVs)*						
Passenger Cars	1 72,008	1,33,651	1,30,112	1 02,558	37,599	36,223
Utility Vehicles (UVs)	1 91,154	1,86,123	1,38,780	1 75,278	16,336	17,410
Vans	7,343	10,323	7,309	10,226	24	459
Total Passenger Vehicles (PVs)	**3,43,505**	**3,30,097**	**2,76,231**	**2,88,062**	**53,959**	**54,092**
Three Wheelers						
Passenger Carrier	96,340	67,621	33,848	47,602	30,952	25,689
Goods Carrier	9,075	10,268	8,885	9,281	237	460
E-Rickshaw	2,930	2,942	2,651	2,563	-	-
E-Cart	235	287	230	292	-	-
Total Three Wheelers	**78,580**	**81,118**	**45,664**	**59,738**	**30,889**	**26,146**
Two Wheelers						
Scooter/ Scooterettes	4 92,222	5,42,500	4,1 2,824	5 09,119	25,459	40,381
Motorcycle/Step-Throughs	10 87,748	12,33,816	7,88,893	10 70,798	2,61,086	2,37,797
Mopeds	40,179	40,889	34,465	43,482	492	39
Total Two Wheelers	**16,20,449**	**18,17,205**	**12,36,282**	**16,23,399**	**2,87,037**	**2,78,214**
Quadricycle	**151**	**323**	**60**	**63**	**132**	**300**
Grand Total	**20,42,685**	**22,28,743**	**15,58,237**	**19,71,262**	**3,72,017**	**3,58,752**

* BMW, Mercedes JLR, Tata Motors and Volvo Auto data is not available

Society of Indian Automobile Manufacturers | 13/12/2023

SIAM						
Summary Report: Cumulative Production, Domestic Sales & Exports data for the period of April-November 2023						
						Report I (Number of Vehicles)
Category	Production		Domestic Sales		Exports	
Segment/Subsegment	April-November		April-November		April-November	
	2022-23	2023-24	2022-23	2023-24	2022-23	2023-24
Passenger Vehicles (PVs)*						
Passenger Cars	14,33,030	13 21,007	11,51,088	10,42,625	2 72,344	2,86,804
Utility Vehicles (UVs)	14,26,905	17 13,984	12,62,488	15,60,587	1 48,513	1,52,519
Vans	90,960	96,102	90,672	96,987	268	5,343
Total Passenger Vehicles (PVs)	**29,50,895**	**31,31,093**	**25,04,148**	**27,00,399**	**4,22,125**	**4,44,766**
Three Wheelers						
Passenger Carrier	4,90,653	5 88,658	2,16,652	3,78,711	2 74,623	2,04,753
Goods Carrier	65,255	74,159	62,398	70,731	2,647	2,081
E-Rickshaw	15,714	24,017	15,350	24,677	-	-
E-Cart	2,167	1,992	2,120	2,249	-	-
Total Three Wheelers	**5,73,789**	**6,88,826**	**2,96,430**	**4,76,368**	**2,77,270**	**2,06,834**
Two Wheelers						
Scooter/ Scooterettee	39,88,840	42 87,804	36,90,501	39,64,293	2 83,234	3,49,388
Motorcycle/Step-Throughs	95,85,679	97 99,957	72,15,905	79,74,760	23 93,693	19,04,911
Mopeds	3,04,579	3 20,001	3,06,723	3,19,551	2,274	1,098
Total Two Wheelers	**1,38,79,098**	**1,44,07,762**	**1,12,13,129**	**1,22,58,604**	**26,79,201**	**22,55,397**
Quadricycle	**1,283**	**2,911**	**421**	**603**	**960**	**2,378**
Grand Total	**1,74,05,065**	**1,82,30,592**	**1,40,14,128**	**1,54,35,974**	**33,79,556**	**29,09,375**
* BMW, Mercedes, JLR, Volvo Auto data is not available and Tata Motors data is available for April-September only Society of Indian Automobile Manufacturers (12/ 2/2023)						

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